

Creating Effective Web Maps

*AGIC 2009 Technical Workshop
David Vaillancourt - ESRI*



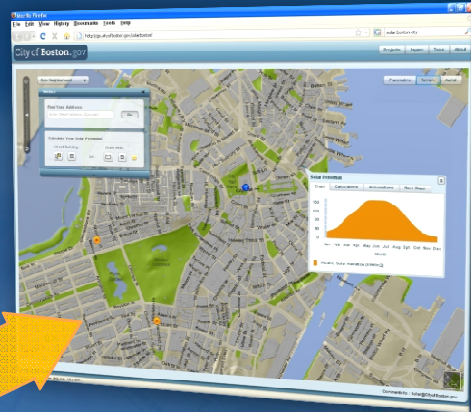
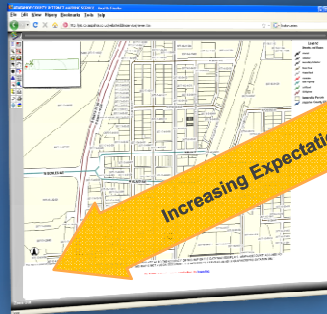
Workshop Agenda

- Web maps overview
- Resources to help you get started
- Best practices for authoring maps
- Publishing map services
- Configuring Web applications

Growing expectations

New era of Web maps

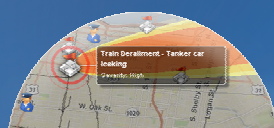
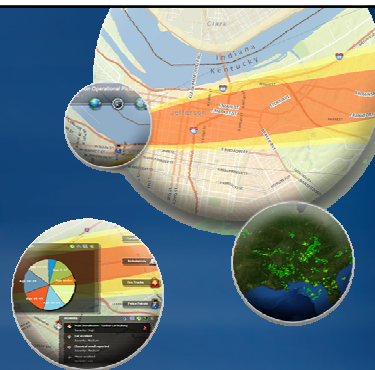
- Consumer mapping sites have raised the bar
- “One-size fits all” Web map will not work



Increasing Expectations

What makes a great web map?

- Fast
- Easy to use
- Modern looking
- Designed for the end user
- Targeted data layers



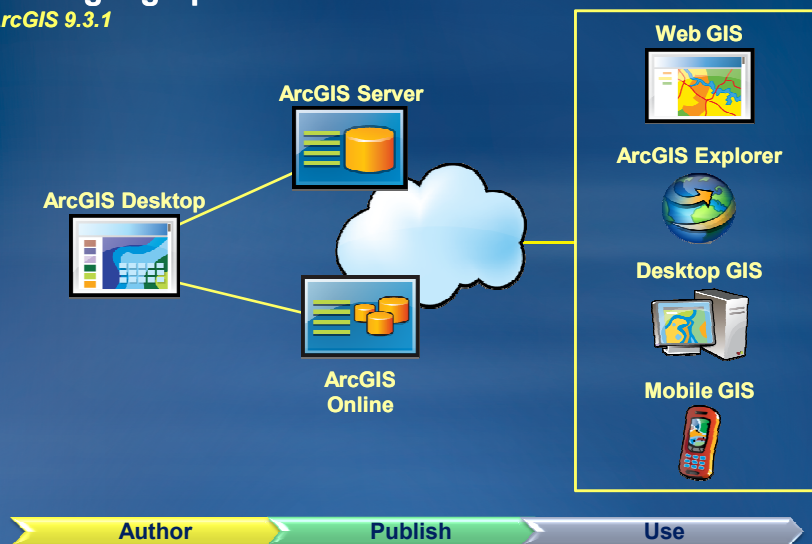
Demonstration

Maryland, Greeley, Boston



Share geographic content

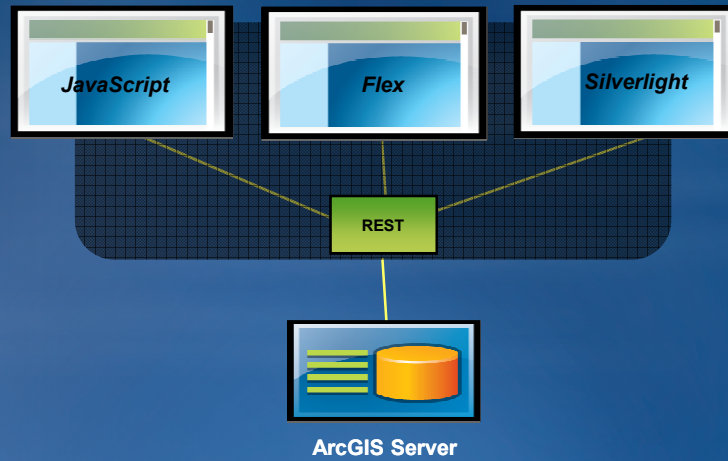
ArcGIS 9.3.1



The Web as a GIS platform

ArcGIS Server Web APIs

Rich Internet Applications



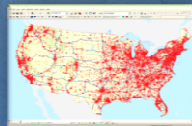
ArcGIS Online content

Leverage data and services

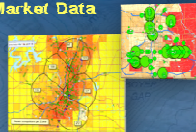
Imagery & Elevation



Geocoding & Routing Services



Demographics & Market Data



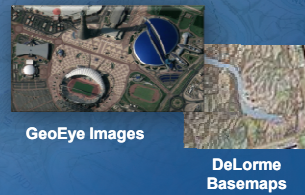
Street Maps



Basemaps & Globes

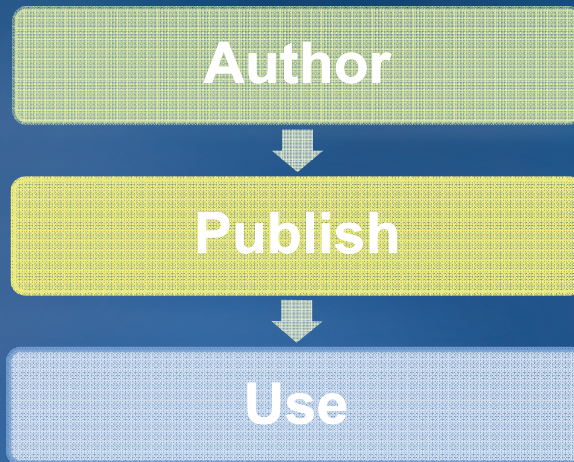


Coming soon...



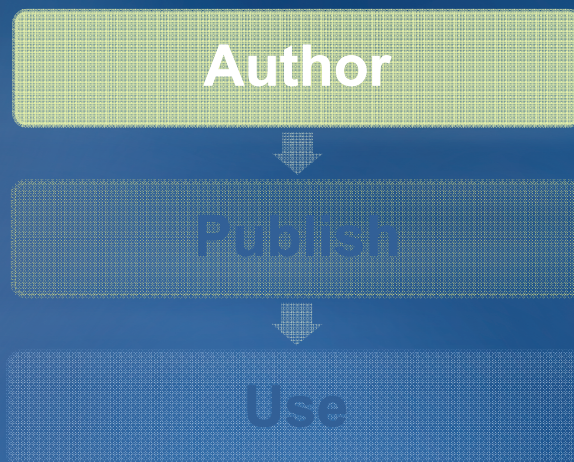
Steps for creating effective Web maps

Process for success



Steps for creating effective Web maps

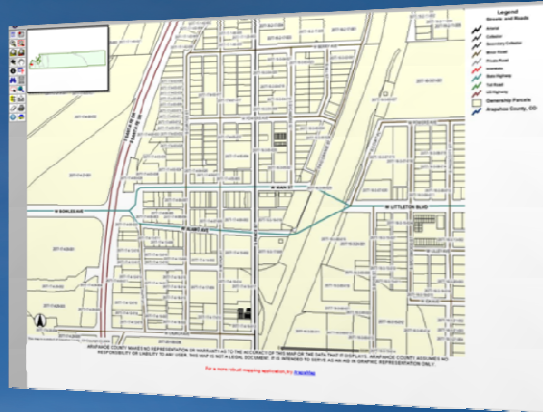
Authoring maps



Web maps 1.0

Common pitfalls

- Too many data layers
- Toggling every layer on/off
- Poor cartography
- No scale dependency
- Slow dynamic drawing



Web maps 2.0

Change your approach

- Only include layers that support the business need
- Logical grouping of layers
- Small number of layers to turn on and off
- Choose the best option for publishing the map
 - Cached tiles
 - Dynamic layers
 - Client-side graphics

Organize data into logical groupings

Basemaps

- Geographic frame of reference
- Contain static vector and raster data
- Reusable in multiple applications



Operational Layers

- Show a focused item of interest
- Support functionality of the application
- Displayed on top of basemap



Basemaps

Provide geographic reference

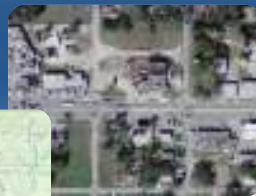
- Use your own resources
 - Your authoritative data
- Consider using ArcGIS Online



ArcGIS Online



Topo Map



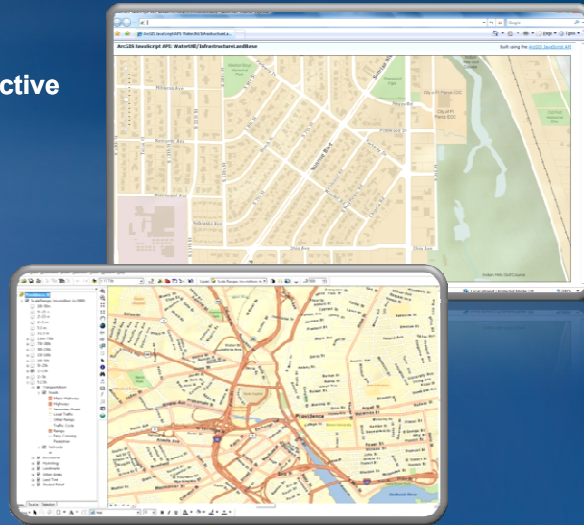
Imagery



City Map

Map templates

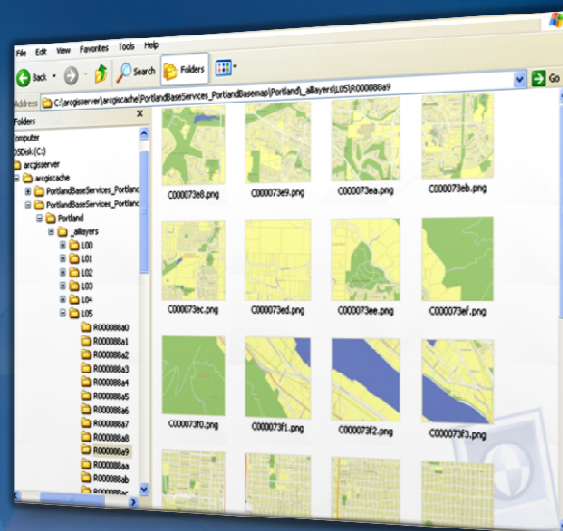
- **Designed to be attractive and functional**
- **Variety of templates**
 - Street map
 - Topographic map
 - Hydrographic map
 - Demographic map
 - Geologic map
 - Parcel map
 - Soil map



...available on the ArcGIS Resource Center

Benefits of map caching

- **Best performance**
- **Improved scalability**
- **More options for cartography**



Resources for building a map cache

- Virtual Campus Web training seminar
 - *[Implementing and Optimizing ArcGIS Server Map Caches](#)*
- ArcGIS documentation: Caching Services topic
- ArcGIS Server blog, map cache tag
<http://blogs.esri.com/Dev/blogs/arcgisserver/>
- Instructor-led training courses
 - *Introduction to ArcGIS Server*
 - *ArcGIS Server: Web Administration Using the Microsoft .NET Framework*
 - *Building Web Maps Using the ArcGIS API for JavaScript* (coming soon)

Operational layers

Application focus

- For dynamic content
 - Observations, sensor feeds, incidents
 - Query or computation results
 - Result layers derived from geoprocessing
 - Editing and data access layers



Incidents, Customer Calls, Work Orders



Inundation Areas & Affected Buildings

Operational layer display

Choose the best option

- Dynamic map layers
 - Real-time data
 - Frequently changing data
- Cached map layers
 - High volumes of traffic
 - Do not change often
- Client-side graphics
 - Informational popups
 - Query or geoprocessing results



Optimized map services

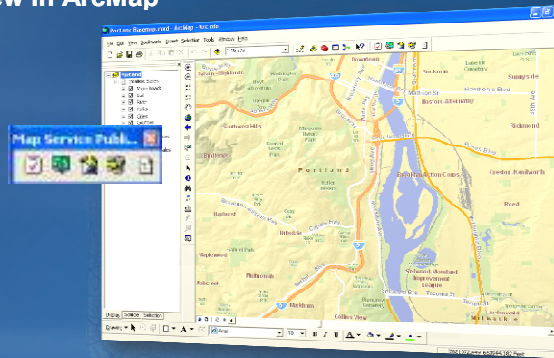
New at ArcGIS 9.3.1

- New high performance drawing engine
 - Completely redesigned
 - Focused on symbology and cartography
- Provide best performance for dynamic maps
- Build the cache faster
- Uses a map document (.MXD) to create a map service definition file (.MSD)

Map Service Publishing toolbar

New at ArcGIS 9.3.1

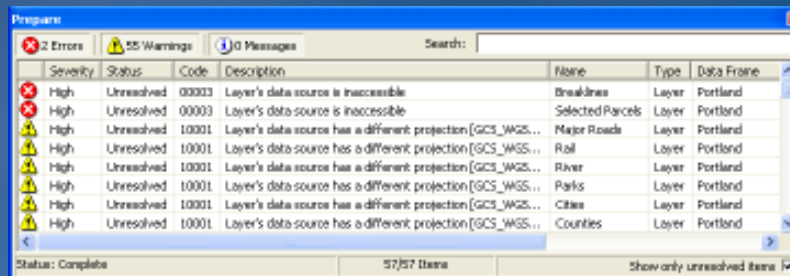
- Identify layers or issues that may degrade performance
- Available in ArcView, ArcEditor, and ArcInfo
- Analyze and preview in ArcMap



Analyze the map

Improve performance

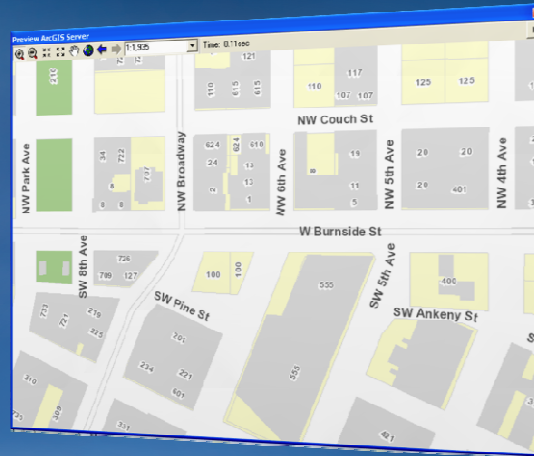
- Discover content affecting performance
- Review results: errors, warnings, and messages
- Preset solutions available in the analysis tool



Preview the map

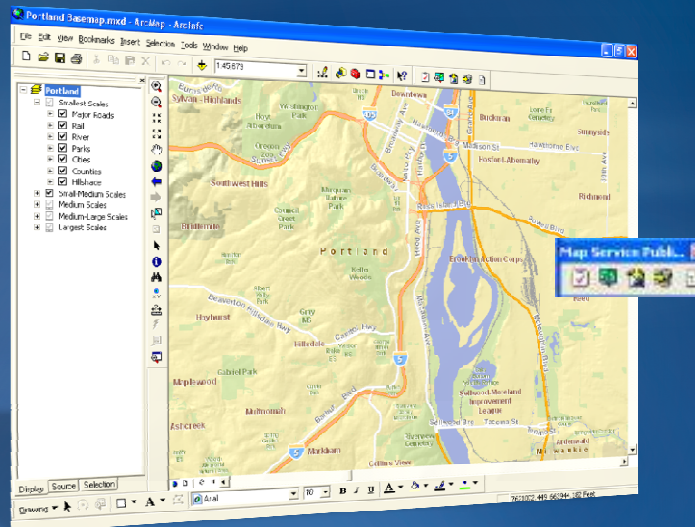
Improve performance

- Assess drawing performance and graphic quality before publishing



Demonstration

Map Service Publishing toolbar



Performance tips

Services

- Caching always gives best performance
- Use optimized map services for operational layers
- Use standard map services for layers that cannot be optimized

Performance tips

Map documents

- Complex things do not scale — keep map documents as simple as possible
- Use common projection for all data layers
- Remove unused layers
- Use scale dependencies
- Make direct calls to Web services from client applications

Performance tips

Database

- Optimize and tune your database
- Use Direct Connect to connect your map service to your database
- Store file-based data (e.g., file geodatabase) on the SOC server
- Use spatial and attribute indexes

Steps for creating effective Web maps

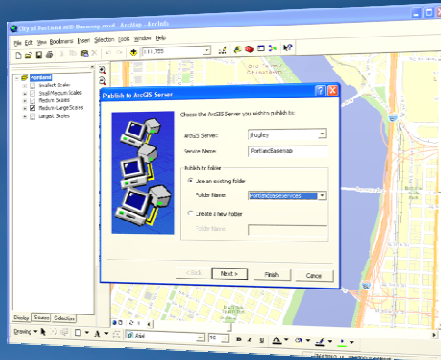
Publishing map services



Publishing optimized map services

Two options

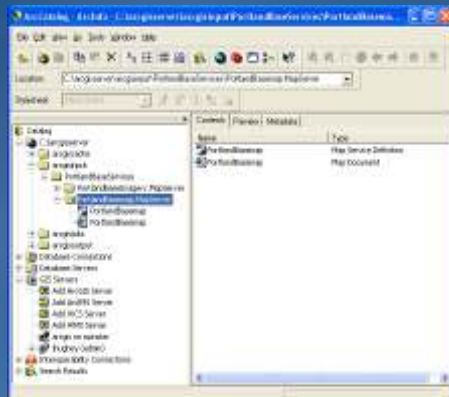
- Desktop Users
 - Save map service as an MSD
 - Administrator publishes map service
- Server Administrators
 - Publish directly from ArcMap



Managing optimized map services

Best practices

- Store your MSD and MXD together
 - Do not delete the MXD



Need to make changes?

- Layer properties
- Layer cartography
- Remove or add layer

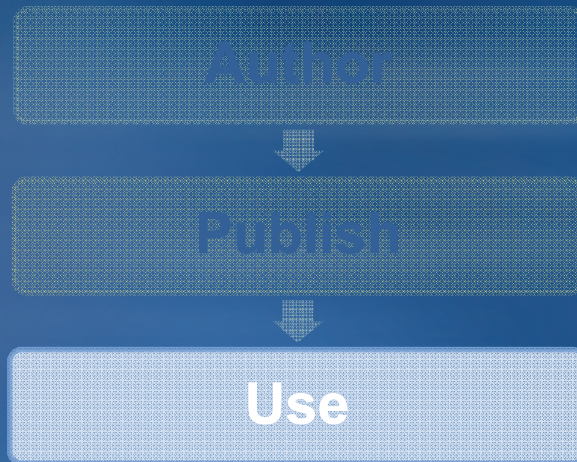


Change the original MXD

- Resave the MSD
- Restart the service

Steps for creating effective Web maps

Configuring Web applications



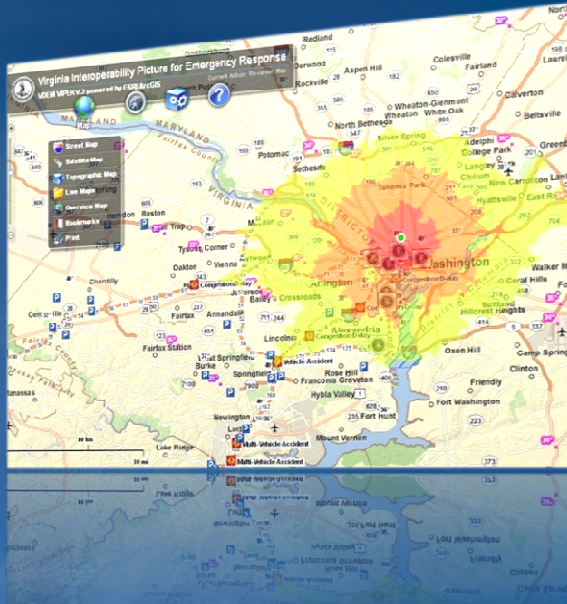
Considerations for your Web map

- What is the purpose of the application?
- What business problem will it solve?
- Who are the end users?
- Will this be an internal or public-facing Web site?
- Which data do you need to include?
- What development environment do you prefer?

Building Web applications

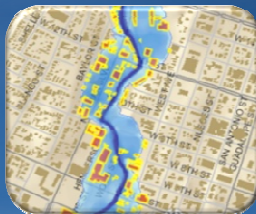
A systematic approach

- Map layers
- Tools and tasks
- Reporting



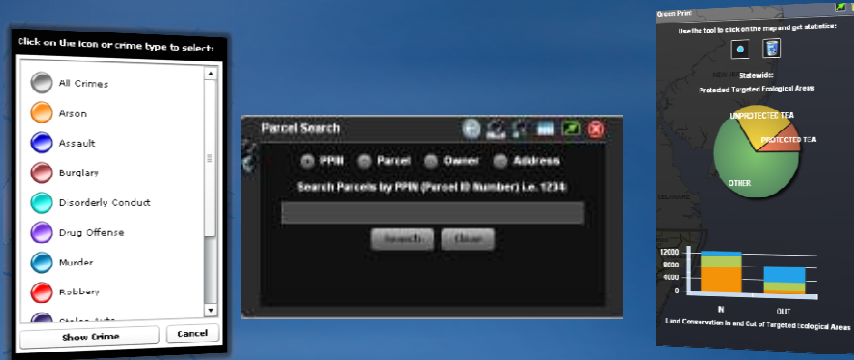
Map layers in Web applications

- Use basemap layers for geographic reference
- Operational layers are for the focus of the application
- Follow best practices for authoring and publishing



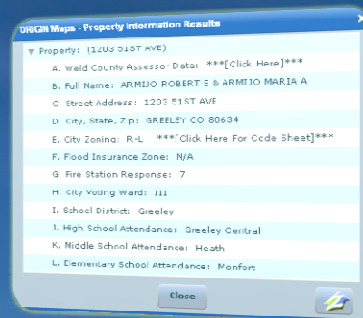
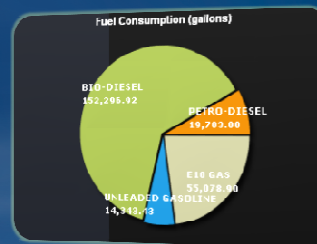
Tools and tasks in Web applications

- Design tools for end users
- Tools go with specific map layers, not the entire application
- Functionality does not have to be a button on the toolbar



Reporting information in Web applications

- Eliminate GIS terminology
- Target report to end user
- Choose best option
 - Map labels
 - Information popup
 - Results of geoprocessing task
 - Client-side charts



We support key technologies for Web applications

Open platform for the Web

Web Applications

JavaScript™



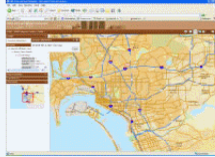
Flex™



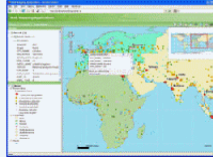
Silverlight™ / WPF™



.NET



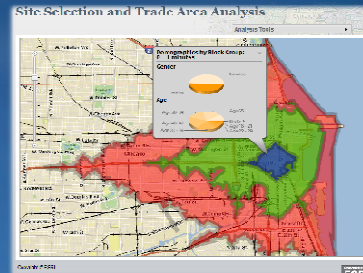
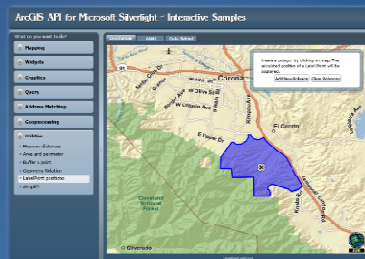
Java



ArcGIS Web APIs

JavaScript, Flex, Silverlight

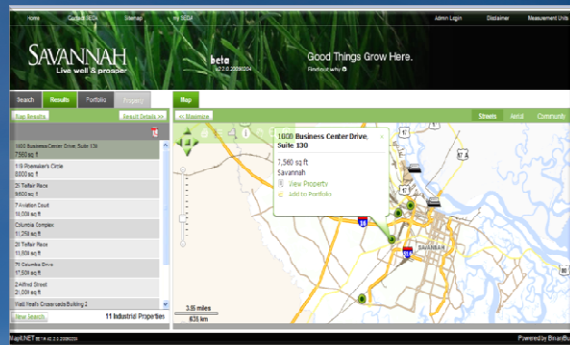
- Embed maps and tasks into your Web application
- All provide common capabilities
- Chose the environment that suits your business needs
- Available at the ArcGIS Resource Center



ArcGIS Server API for JavaScript™

Collection of JavaScript classes

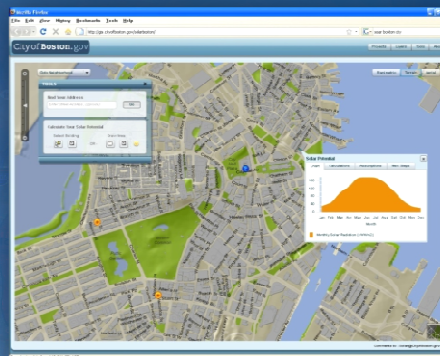
- Does not require Web application server (IIS, Apache/Tomcat)
- Compatible with all Web browsers
- No plug-in
- Develop in a text editor



ArcGIS API for Flex™

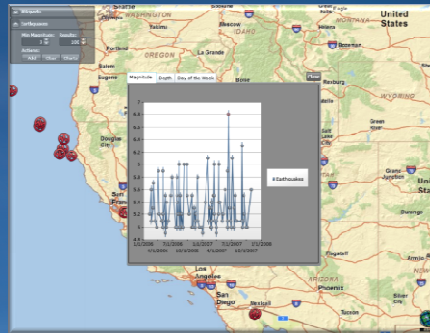
Collection of Action Script classes

- Popular development environment
- Flash Player installed on most computers
- Cross-browser compatibility
- Develop in IDE (Adobe Flex Builder 3)



ArcGIS API for Microsoft Silverlight™/WPF™

- Growing in popularity
- Silverlight plug-in included in Windows OS and applications
- Cross-browser compatibility
- Develop in IDE (Visual Studio or Visual Web Developer Express)



Sample viewers for ArcGIS Server

- Configurable solutions
 - No programming necessary
- Extendable
- Modern-looking
- Available now for JavaScript, Flex, and Silverlight APIs
- Strong community of users



...20,000+ downloads!

Configuring the sample viewer

No coding required

- Includes an XML configuration file
- Make changes to the configuration file in a text editor (e.g., Notepad)
 - Point to your data
 - Customize or remove widgets

```
<!-- Configuration -->
<!-- Base Properties -->
<banner visible="true">
  <file>FlexViewer.css</file>
  <visible>Powered by ArcGIS Servers</visible>
  <logo>com/esri/solutions/flexviewer/assets/images/logo.png</logo>
  <stylesheet>com/esri/solutions/flexviewer/themes/darkangel/style.swf</stylesheet>
</banner>
<!-- Menu -->
<menu id="menuMap" visible="true" icon="com/esri/solutions/flexviewer/assets/images/icons/L_globe.png">Map</menu>
<menu id="menuNav" visible="true" icon="com/esri/solutions/flexviewer/assets/images/icons/L_nav.png">Navigation</menu>
<menu id="menuWidgets" visible="true" icon="com/esri/solutions/flexviewer/assets/images/icons/L_widget.png">Tools</menu>
<menu id="menuHelp" visible="true" icon="com/esri/solutions/flexviewer/assets/images/icons/L_help.png">Help</menu>
</menu>
</interface>
<!-- Map -->
<map id="map" extent="122.2 34.89 -70.59 46.02" fullExtent="150 -50 150 50">
  <!-- Base Map -->
  <mapService id="baseMap" type="dynamic" visible="true" alpha="1">
    <url>com/esri/solutions/flexviewer/assets/images/icons/L_highway.png</url>
    <url>http://server.arcgisonline.com/ArcGIS/rest/services/Satellite_Maps</url>
    <icon>com/esri/solutions/flexviewer/assets/images/icons/L_shuttle.png</icon>
    <url>http://server.arcgisonline.com/ArcGIS/rest/services/
  </mapService>
  <!-- Dynamic Map -->
  <mapService id="dynamicMap" type="dynamic" visible="false">
    <url>http://sampleserver1.arcgisonline.com/ArcGIS/rest/services/Louisville/L01C_LandRecords_Louisville/MapServer
  </mapService>
</map>
```

Extend the sample viewer

No coding required

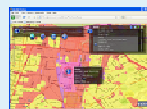
- Find additional sample code and widgets at the Resource Center
- Download and add them to your application
 - Same configuration process as sample viewer

Code Gallery

Identify Widget for Sample Hex Viewer

This sample widget was designed specifically to extend the functionality of the base Sample Flex Viewer with feature identify functionality.

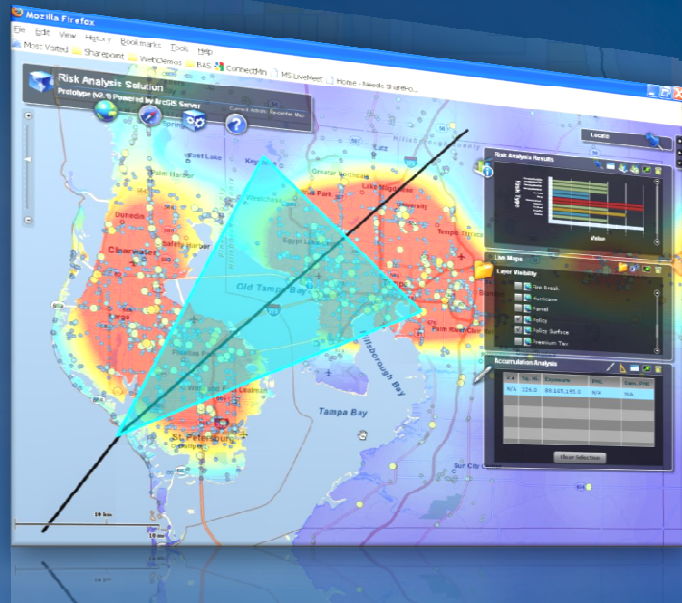
| | |
|-------------------|--|
| Author | Sample Viewer Team |
| Date Submitted | 12-09-2009 |
| Date Last Updated | 12-13-2009 |
| Language | Flex |
| Product/Version | ArcGIS Server 9.3 |
| Views | 2261 |
| Downloads | 944 |
| License Type | ESRI Attribution and License Agreement |



```
<!-- Configuration -->
<!-- Identify Widget -->
<identify id="identify" visible="true" type="dynamic">
  <url>com/esri/solutions/flexviewer/assets/images/icons/L_identify.png</url>
  <icon>com/esri/solutions/flexviewer/assets/images/icons/L_identify.png</icon>
  <url>http://server.arcgisonline.com/ArcGIS/rest/services/Satellite_Maps</url>
  <icon>com/esri/solutions/flexviewer/assets/images/icons/L_shuttle.png</icon>
  <url>http://server.arcgisonline.com/ArcGIS/rest/services/
</identify>
</map>
```


Demonstration

Sample viewers



Thanks for your attention!

David Vaillancourt
ESRI